



## Measurement Uncertainty Training Workshop, 17 – 18 May 2022

### Agenda

all times are CEST (German time), dial-in details below

This workshop is organized by the MATHMET activity MU Training. It aims to strengthen training capabilities and improve existing courses on measurement uncertainty by facilitating the exchange of expertise, good practice as well as of experiences in developing and running training courses. Partners and stakeholders of the MU Training activity will discuss newly developed training material, share best practices in measurement uncertainty training, learn from teaching experts and how to target audiences at the end of the measurement chain.

#### Tuesday 17 May

13:30 Opening of the workshop (Katy Klauenberg, PTB)

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#### Overview of courses and classroom examples on MU evaluation

(Francesca Pennechi, INRIM)

13:40 Survey of training courses on MU evaluation (Francesca Pennechi, INRIM)

- Status of the surveys
- Results of the analysis of main features of available courses

13:55 Discussion (Moderators: Francesca Pennechi, INRIM, Katy Klauenberg, PTB)

- Questions from the audience on the analysis presented
- Comments on specific aspects of the courses
- Identification of gaps, improvements and needs

14:10 Survey of classroom examples on MU evaluation (Peter Harris, NPL)

- Status of the survey
- Results of the analysis of main features of available examples

14:25 Discussion (Moderators: Peter Harris, NPL, Katy Klauenberg, PTB)

- Questions from the audience on the analysis presented
  - Comments on specific aspects of the classroom examples
  - Identification of gaps, improvements and needs
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14:40 Coffee break

#### Sharing best practices in MU training (Marc-Olivier André, METAS)

The session aims at an exchange and discussion on best practices drawn from the project participant teaching experience.

15:00 Brief introduction (Marc-Olivier André, METAS)

15:05 Task 2.2 representatives present 2-3 slides on their best practices and lessons learnt (positive and negative)

- What makes the presenter's course unique? Didactical or pedagogical highlights, theory vs. hands-on, specific exercises ideally tailored to meet the need, etc.?
- "Lessons learnt" and top 3 improvements derived from them
- Tricks and tips
- What would the presenter aspire/dream to implement?
- Open discussion

16:00 Break

16:10 Presentations continued

16:30 General discussion (All)

16:45 Wrap-Up and Conclusions (Marc-Olivier André, METAS)

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16:55 Closing day 1

**Wednesday 18 May**



## **Learning from teaching experts (Katy Klauenberg, PTB)**

With the GUM documents the content of measurement uncertainty courses seem clear. This session will contribute to how this content is best presented to trainees. Experts from training units and didacts will present theory and experience, on how to set up courses or how to engage trainees.

### **09:30 NPL's training development process (Michael Lingard, NPL)**

An overview of NPL's training development process, and the role of the Training team within that process, that includes:

- Defining a blueprint – an outline pathway through the content area
- Course identification and composing learning outcomes
- Course map – visual information structure, plus site map if online, incorporating educational theory
- Course build – manuals, slides, and workbooks for classroom; LMSs (similar to VLEs) and authoring tools for online

### **09:58 Pedagogical choices for skills acquisition (Michèle Desenfant, LNE)**

- Learning objectives
- Skills & Pedagogy
- How you check skill acquisition

### **10:20 Overview of Research on Teaching Measurement Uncertainty (Philipp Möhrke, UKN)**

- Overview of international research results of the last years
- Research at UKN
- The flipped classroom design course at UKN

### **10:48 Project: implementation of flipped classroom at DAM (Cord Mueller, DAM)**

- Shortcomings of traditional classroom teaching
- Blended-learning project at DAM
- Toward flipped-classroom teaching

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**11:00 Coffee break**

## **Targeting audiences at the end of the measurement chain (Martin Czaske, PTB)**

Personnel performing verification, testing or conformity assessment require an understanding of measurement uncertainty. However, training courses with full mathematical details how to evaluate standard uncertainties with per mill precision may be off target. This session will contribute to clarifying the needs of trainees working with uncertainty at the end of the measurement chain, and will present experiences with as well as recommendations for such audiences.

### **11:15 On the practical experiences of MU-trainings for laboratory and industry partners (Stefan Jurgeit, Christian Sander, Matthias Ohlrogge, Testo Industrial Services GmbH)**

Typical customers, Covered topics, Special needs vs. standard, Consulting related to MU, Knowledge difference among participants, Practical examples, Requirements

### **11:35 Teaching MU with a minimum of mathematical content (Oliver Power, NSAI)**

- Typical audience for NSAI MU training course (including their reasons for attending)
- Adaption of the NSAI course content over the years to address feedback from participants
- Overview of the present course structure and content
- Some examples of typical challenges and misunderstandings

### **11:55 MU course for the community of legal bodies (João Alves e Sousa, IPQ)**

- The audience and their needs (different working groups)
- Main challenges identified and current state of the art (from WLEMEC Guides and interviews)
- Proposed course structure based on discussions with WELMEC
- Examples for typical case studies
- Discussion

### **12:15 Feedback from MU trainees in Belgium - an informal interview approach (Thierry Caebergs, Anne-Sophie Piette, SMD)**

- Interviewing Belgian audience for feedback, perception
- Few trainings but various audiences
- Evaluate interviews to improve courses for all attendees

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**12:40 Closing of the workshop**

**Organisation:** Katy Klauenberg (PTB), Marc-Olivier André (METAS), Thierry Caebergs (SMD), Séverine Demeyer (LNE), Peter Harris (NPL), Philipp Möhrke (UKN), Cord Mueller (DAM), Francesca Pennechi (INRIM), M<sup>a</sup> del Mar Pérez Hernández (CEM), Oliver Power (NSAI), João Alves e Sousa (IPQ)

**Meeting venue:** Teams, courtesy of Marc-Olivier André (METAS) and EURAMET

**Teams dial-in details:** [https://teams.microsoft.com/l/meetup-join/19%3ameeting\\_NGQ1OWU0NWMtMzUwMi00ZjZmLTg5ZjktNWE0NDZhZGNIODU0%40thread.v2/0?context=%7b%22Tid%22%3a%22895bcacf-f0dd-4f68-971c-840ee63b1e57%22%2c%22Oid%22%3a%228f732e3a-8ea2-404a-edef-2047c66b5408%22%7d](https://teams.microsoft.com/l/meetup-join/19%3ameeting_NGQ1OWU0NWMtMzUwMi00ZjZmLTg5ZjktNWE0NDZhZGNIODU0%40thread.v2/0?context=%7b%22Tid%22%3a%22895bcacf-f0dd-4f68-971c-840ee63b1e57%22%2c%22Oid%22%3a%228f732e3a-8ea2-404a-edef-2047c66b5408%22%7d)

invitations will follow